TITLES AND ABSTRACTS FOR CLAP 1

Peiyi Cui (Vienna), *A category decomposition of the category of modulo ℓ representations of* $\mathrm{SL}_n(F)$

Let F be a p-adic field, and k an algebraically closed field of characteristic ℓ different from p. In this talk, we will first give a category decomposition of $\mathrm{Rep}_k(\mathrm{SL}_n(F))$, the category of smooth k-representations of $\mathrm{SL}_n(F)$, with respect to the $\mathrm{GL}_n(F)$-equivalent supercuspidal classes of $\mathrm{SL}_n(F)$, which is not always a block decomposition in general. We then give a block decomposition of the supercuspidal subcategory $\mathrm{Rep}_k(\mathrm{SL}_n(F))_{\mathrm{SC}}$, by introducing a partition on each $\mathrm{GL}_n(F)$-equivalent supercuspidal class by type theory, which gives a prediction of the block decomposition of $\mathrm{Rep}_k(\mathrm{SL}_n(F))$. We give an example where a block of $\mathrm{Rep}_k(\mathrm{SL}_2(F))$ is defined with several $\mathrm{SL}_2(F)$-equivalent supercuspidal classes, which is different from the case where ℓ is zero. We end this talk by giving a prediction on the block decomposition of $\mathrm{Rep}_k(A)$ for a general p-adic group A.

Rahul Dalal (Johns Hopkins), *Counting level-*1*, quaternionic automorphic representations on* G_2

Quaternionic automorphic representations are one attempt to generalize to other groups the special place holomorphic modular forms have among automorphic representations of GL_2. Like holomorphic modular forms, they are defined by having their real component be one of a particularly nice class (in this case, called quaternionic discrete series). We count quaternionic automorphic representations on the exceptional group G_2 by using Arthur's stable trace formula to develop a G_2 analogue of the classical Eichler–Selberg trace formula for holomorphic modular forms.

Sarah Dijols (UBC), *Parabolically induced representations of p-adic* G_2 *distinguished by* SO_4

Distinguished representations are the building blocks in the unitary dual of G for harmonic analysis on the homogeneous space G/H. In this talk, I will present some recent results where I identified some distinguished representations of the p-adic exceptional group G_2 distinguished by its subgroup SO_4. This work is the first implementation of a known method involving the geometric lemma of Bernstein–Zelevinsky to an exceptional group.

Melissa Emory (Toronto), *Restriction of representations*

Restriction problems are one of the most natural problems regarding representations, present from the early days of representation theory. In general, the question is how a representation of a group decomposes when restricted to a subgroup. In the 1990s, Benedict Gross and Dipendra Prasad formulated an intriguing conjecture regarding the restriction of representations, also known as branching laws, of special orthogonal groups. Gan, Gross and Prasad extended this conjecture, now known as the Gan-Gross-Prasad (GGP) conjecture, to the remaining classical groups in 2012. In this talk, we will discuss the GGP conjectures and work to extend these conjectures to a non-classical group, the general spin group.

Shayan Gholami (Paris), *Vanishing of non-Eisenstein cohomology of locally symmetric spaces for* GL_2 *over a CM field*

Locally symmetric spaces are generalizations of modular curves, and their cohomology plays an important role in the Langlands program. In this talk, I will first speak about vanishing conjectures and known results about the cohomology of locally symmetric spaces of a reductive group G with mod p coefficients after localizing at a maximal ideal of spherical Hecke algebra of G and after that, I will explain a sketch of my proof for the case $G = \mathrm{GL}_2(F)$, where F is a CM field.

Chi-Yun Hsu (UCLA), *Partial classicality of Hilbert modular forms*

Overconvergent Hilbert modular forms are defined over a strict neighborhood of the ordinary locus of the Hilbert modular variety. The philosophy of classicality theorems is that when the p-adic valuation of U_p-eigenvalue is small compared to the weight (called a small slope condition), an overconvergent U_p eigenform is automatically classical, namely it can be extended to the whole Hilbert modular variety. On the other hand, we can define partially classical forms as forms defined over a strict neighborhood of the zero locus of a sub-collection of partial Hasse invariants. We show that under a weaker small slope condition, an overconvergent form is automatically partially classical, employing Kassaei's method of analytic continuation.

Kalyani Kansal (Johns Hopkins), *Intersections of irreducible components of Emerton-Gee stack for* GL_2

We compute criteria for codimension one intersections of the irreducible components of EG stack for GL_2, and interpret them in sheaf-theoretic terms.

Thiago Landim de Souza Leão (Paris), *Categorical Local Langlands Correspondence*

In recent years, developments in the local Langlands correspondence (LLC) in families and in the categorical geometric Langlands correspondence has motivated the search for a formulation of a categorical version of the LLC. One possible first step is restricting unipotent representations and working with Hecke algebras. This was worked out by Ben-Zvi, Chen, Helm and Nadler, and it allowed them to categorify the LLC for $\mathrm{GL}_n(F)$.

Jie Lin (Essen), *Deligne's conjecture for automorphic motives*

In this talk, we will first introduce a conjecture of Deligne on special values of L-functions. This conjecture generalizes the famous result by Euler on the Riemann zeta values at positive even integers, and predicts a relation between motivic L-values and geometric periods. We will then explain an approach towards this conjecture for automorphic motives and summarize some recent progress (joint with H. Grobner and M. Harris).

Zeyu Liu (UCSD), *De Rham prismatic crystals over $\mathcal{O}_K$*

We study de Rham prismatic crystals on $(\mathcal{O}_K)_{\Delta}$. We show that a de Rham crystal is controlled by a sequence of matrices $\{A_{m,1}\}_{m\geq 0}$ with $A_{0,1}$ "nilpotent". Using this, we prove that the natural functor from the category of de Rham crystals over $(\mathcal{O}_K)_{\Delta}$ to the category of nearly de Rham representations is fully faithful. The key ingredient is a Sen style decompletion theorem for B^+_{dR}-representations of G_K.

Basudev Pattanayak, *On Bernstein components of Gelfand–Graev representations*

Let G be a connected reductive group defined over a non-archimedean local field F. Let B be a minimal F-parabolic subgroup with Levi factor T and unipotent radical U. Let ψ be a non-degenerate character of $U(F)$ and λ be a smooth character of $T(F)$. Let (K,ρ) be a Bushnell–Kutzko type associated to the Bernstein block of $G(F)$ determined by the pair $(T(F),\lambda)$. We study the ρ-isotypical component $(c\text{-ind}_{U(F)}^{G(F)}(\psi))^{\rho}$ of the Gelfand–Graev(induced) representation $c\text{-ind}_{U(F)}^{G(F)}(\psi)$ realized by functions whose support is compact mod $U(F)$. We show that $(c\text{-ind}_{U(F)}^{G(F)}(\psi))^{\rho}$ is cyclic module for the Hecke algebra $\mathcal{H}(G(F),\rho)$ associated to the pair (K,ρ). When T is split, we describe it more explicitly in terms of $\mathcal{H}(G(F),\rho)$ under the assumption that the center of G is connected and some assumptions on residue characteristic of F. Our results generalize the main result of the article "Iwahori component of the Gelfand–Graev representation" by Kei Yuen Chan and Gordan Savin, who treated the case of $\lambda = 1$ when T is split. This is joint work with Manish Mishra.

David Schwein (Cambridge), *Local factors and the Plancherel measure*

Reductive p-adic groups admit a noncommutative Fourier transform which expresses a function on the group as the integral over the unitary dual of its traces on representations. The measure appearing in this integral is called the Plancherel measure and plays an important role in harmonic analysis. At the same time, the Plancherel measure can conjecturally be expressed as a product of of local L- and ε-factors. This talk will report on progress towards proving the conjecture and computing these quantities.

Jay Swar (Oxford), *Symplectic geometry on Selmer spaces*

The Siegel–Faltings theorems state that curves with non-abelian fundamental groups have finitely many S-integral points; however, explicit computation of the set of such points is still a major generically-open problem.

In this talk, I'll show how local Tate duality provides a symplectic form on the cotangent bundle of certain moduli spaces associated to any variety (not necessarily a curve). I'll then show how non-abelian Kummer maps send the S-integral points into the intersection of some nice (i.e. Lagrangian) subspaces of these cotangent bundles and state how these intersections can be explicitly described as the critical locus of a regular function. This is joint work with Minhyong Kim.

Ekta Tiwari (Ottawa), *Finding types in irreducible supercuspidal representations*

Types are certain representations of compact open subgroups of G such that an irreducible representation of G contains a given type upon restriction if and only if it lies in the corresponding Bernstein block (of the category of smooth representations of G). Under a tameness hypothesis, all irreducible supercuspidal representations of G are constructed by first constructing a type. The question of unicity is: are these (up to some normalizations) the only ones? To answer this, one can restrict a supercuspidal representation π to each maximal compact open subgroup, and classify the irreducible components as either types or non-types using a variety of means. Our goal is to answer this question in the case of $G = \mathrm{Sp}(4)$.

Yingying Wang (Wuppertal), *Cohomology of the structure sheaf of Deligne–Lusztig varieties for* GL_n

Deligne–Lusztig varieties associated to a connected reductive group G in positive characteristic defined over a finite field $\mathbb{F}_q$ are originally constructed by Deligne and Lusztig (1976) for studying irreducible representations in characteristic 0 of $G(\mathbb{F}_q)$. For $G = \mathrm{GL}_n$, Orlik (2018) provided a double induction strategy for describing the individual ℓ-adic cohomology groups of Deligne–Lusztig varieties. As a first step to understand the cohomology of equivariant vector bundles on Deligne–Lusztig varieties, we consider the structure sheaf case on the smooth compactifications of Deligne–Lusztig varieties for GL_n. In this talk, I will sketch the proofs for the description of the cohomology groups in this case. As a consequence, we obtain the (compactly supported) mod p^r and integral p-adic cohomology groups of Deligne–Lusztig varieties as representations of $\mathrm{GL}_n(\mathbb{F}_q)$.

Tian An Wong (Michigan-Dearborn), *What is ... Beyond Endoscopy? A guide for the perplexed*

Of course, this is a trick question! Different people mean different things when they say "beyond endoscopy." In this mostly expository talk, I will try to provide a very rough but useful map of Beyond Endoscopy and its evolution over time, ranging from Langlands's original proposal, the conjectures of Braverman and Kazhdan, and the relative approach of Sakellaridis et al. Significant time will be allotted for discussion and questions, with an aim towards orienting those who are interested but confused.

Zhiyu Zhang (MIT), *Irreducible components and mod p geometry of Shimura varieties*

The cohomology of Shimura varieties over number fields is expected to realize the Langlands correspondence. Assuming a good theory of (semi-global) integral models, we may also study their mod p geometry and related natural strata. I will focus on irreducible components in general and study some examples from unitary groups. I will explain its relation to the resolution of singularities of integral models. Moreover, (affine) Deligne–Lusztig varieties will appear naturally.